

ABSTRACT OF THE DISCLOSURE

A trench structure and method for semiconductor device isolation are disclosed, including first and second regions of a substrate having first and second trenches, respectively, the first trench having an aspect ratio larger than that of the second trench, a first insulation material on a bottom and sidewalls of the first trench forming a first sub-trench in the first trench, a second insulation material completely filling the first sub-trench, a third insulation material formed on a bottom and sidewalls of the second trench forming a second sub-trench in the second trench, a fourth insulation material formed on a bottom and sidewalls of the second sub-trench, and a fifth insulation material completely filling a third sub-trench formed in the second sub-trench by the fourth insulation material. Trench structures may be formed in high and low aspect ratio trenches in a substrate without the generation of voids therein.